



Designation: F 355 – 95

Standard Test Method for Shock-Absorbing Properties of Playing Surface Systems and Materials¹

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1. Scope

1.1 This test method covers the measurement of certain shock-absorbing characteristics, the impact force-time relationships, and the rebound properties of playing surface systems. This test method is applicable to natural and artificial playing surface systems and to components thereof. Typical playing surfaces are wrestling mats, football fields, soccer fields, playgrounds, etc.

NOTE 1—This test method may also be used to measure the shock-attenuation properties of materials used as protective padding, such as the padding on trampoline frames, football goal posts, gymnasium wall, shoulder pads, body padding, etc. It should not be used, without some modifications, to test the finished products.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

- D 1596 Test Method for Dynamic Shock Cushioning Characteristics of Packaging Materials²
- E 105 Practice for Probability Sampling of Materials³
- E 122 Practice for Choice of Sample Size to Estimate the Average Quality of a Lot or Process³
- E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method³
- F 1292 Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment⁴

¹ This test method is under the jurisdiction of ASTM Committee F-8 on Sports Equipment, Surfaces, and Facilities and is the direct responsibility of Subcommittee F08.52 on Playing Surfaces and Facilities.

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² Annual Book of ASTM Standards, Vol 15.09.

³ Annual Book of ASTM Standards, Vol 14.02.

⁴ Annual Book of ASTM Standards, Vol 15.07.

2.2 SAE Standard:

SAE Recommended J 211 Oct. 90 Instrumentation for Impact Tests, Requirements for Channel Class 1000⁵

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *playing surface system*—a composite that includes the contact surface, energy-absorbing materials, if any, and the substrates.

3.1.2 *base line*—the starting reference plane of the playing surface system from which the total penetration is determined. It is taken as the top plane of the playing surface system, when subjected to a static compression of 1 kPa (0.14 psi) for Procedure A or the weight of missile for Procedure B, unless otherwise specified.

3.1.3 *acceleration*—the instantaneous time rate of change of velocity which may be positive or negative.

3.1.4 *G*—the ratio of the magnitude of missile acceleration during impact to the acceleration of gravity, expressed in the same units.

3.1.5 $G_{\max}$ —the maximum value of *G* encountered during impact.

3.1.6 *severity index*—an arbitrary parameter equal to the integral of $G^{2.5} dt$ over the total duration of impact.

3.1.7 *head injury criteria (HIC)*—a measure of impact severity that takes into account the duration over which the most critical section of the deceleration pulse persists as well as the peak level of that deceleration.

3.1.8 *impact velocity*—the velocity of the missile as it crosses the base line on impact.

3.1.9 *rebound velocity*—the velocity of the missile as it crosses the base line on rebound.

3.1.10 *time to $G_{\max}$* —the difference between the time the missile crosses the base line on impact and the time $G_{\max}$ is reached.

3.1.11 *dynamic hardness index*—the stress on a material due to rapid indentation by a moving missile with the geometry described in Procedure A.

⁵ Available from Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096.